1. PROJECT CODE	2. JPIC CODE	AMS-02 TASK SHEET (ATS)
SA-AMS	AMS	

3. TYPE				4. ATS NO.	5. PAGE
A	CONFIGURATION CHANGE	☒		TCS000001-1-15	1 OF 16
	PERMANENT ☒	TEMPORARY ☐		6. MOD SHEET(S) NUMBER(S)	
B	NONCONFIGURATION CHANGE	☐			

10. PART NAME	11. Sub Detector Name	12. SERIAL/LOT NO.
TCs installation	Star Tracker Cameras	- NA

14. APPLICABLE DOCUMENTS

18. ATS TITLE

TCs installation on Star Tracker

20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	23. QA/DV
	NOTE CAUTION WARNING **THIS ATS COVERS ALL THE INTEGRATION STEPS NEEDED FOR THE INSTALLATION OF THE FLIGHT OR NON-FLIGHT THERMOCOUPLES;** **AS A GENERAL REQUIREMENTS ALL THE STEPS SHALL BE DONE:** **- IN A CONTROLLED ENVIRONMENT (CLEAN ROOM);** **- BY TECHNICIANS.**		

24. ORIGINATOR	DATE	25. FINAL ACCEPTANCE STAMP AND DATE
F.Santarossa (CARSO) 24OCT2009		

APPROVALS *(Printed or Typed and Signed)*

26. PROJECT ENGINEER	DATE	27. QUALITY ENGINEER	DATE
Paolo Trampus (CARSO) 24OCT2009			
28. Corrado Gargiulo (INFN)		29. Giovanni Ambrosi (INFN)	
30. Joseph Burger (AMS thermal)		31. Serena Borsini (INFN)	

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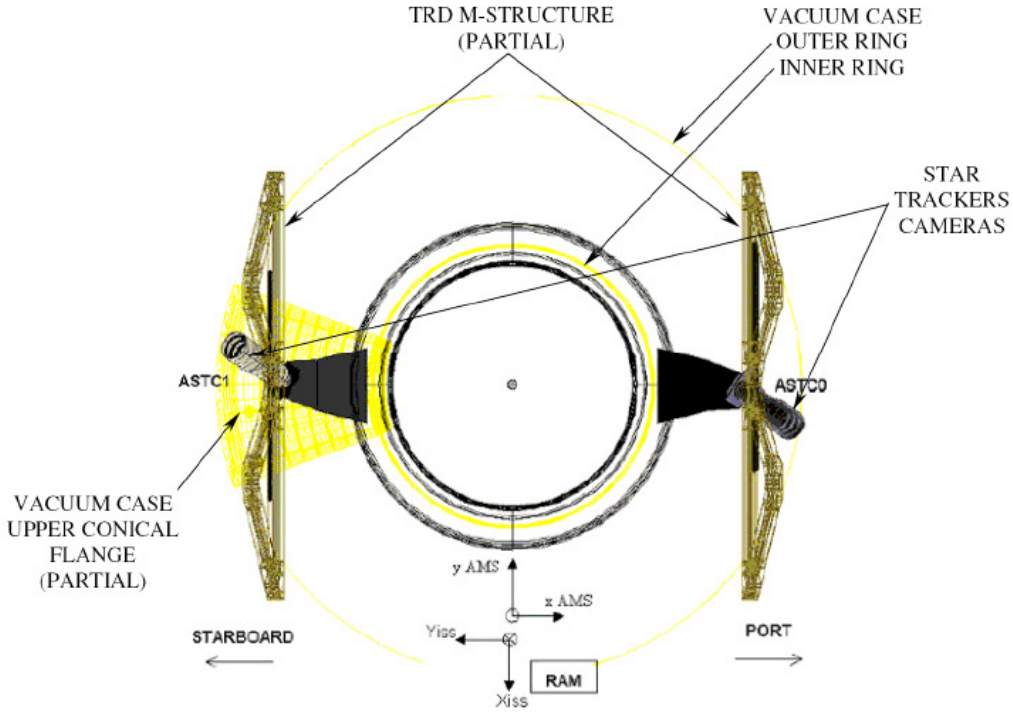
The purpose of this ATS is to describe how and where to fix the flight or non-flight thermocouples on Star tracker.



The TCs are the thermal sensors that will be used during the general AMS02 thermal-vacuum test at ESTEC.

Thermocouples accessible after the thermal vacuum test will be removed. These are called non-flight thermocouples.

Thermocouples not accessible after the TVTB test are called flight thermocouples. The cables of these sensors will be cut as much as possible near the TCs head, after the thermo-vacuum test at ESTEC.

The Project Engineer on site has the option to recorder steps as required .

1. Open this ATS

2. HARDWARE AVAILABILITY AND IDENTIFICATION

Before starting the installation check the availability of the following hardware and fill the following tables with all the technical information.

2.1 TCs sensors list

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Sensor number	Sensor type	Part number	Cable length (m)	Temporary(T)/ Permanent (P)	Note
1	TC	ST TC #1	5	P	
2	TC	ST TC #2	5	P	
3	TC	ST TC #3	5	P	
4	TC	ST TC #4	5	P	
5		ST TC #5		T	
6		ST TC #6		T	
7		ST TC #7		T	
8		ST TC #8		T	

2.2 TCs datasheet.

2.3 Reader for TCs verification :
Type: Keythley 2000 El Pool 0113 0055
Part Number: 1088916

2.4 Instruction sheet/manual for use of reader (multimeter)

2.5 Kapton Tape:

Tape P/N	Lot Number	Expiration Date	Note
3M 1205 25 mm	8218-07	N/A	

2.6 Aluminum tape:

Tape P/N	Lot Number	Expiration Date	Note
3M 425 50 mm	8227-21-68	April 24, 2010	

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2.7 Tool to clean the Star Tracker mounting surface.

2.8 Label for cables: use Kapton tape as label and a permanent marker to write the TCs identification number on the tape.

2.9 Isopropyl alcohol.

2.10 Antistatic cloth.

2.11 Camera

3. TCs PRE-INSTALLATION VERIFICATION
Before to install the TCs on the detector, check their correct functioning using the handheld reader and compare the results with the temperature in the clean room. See instruction sheet for use of a Multimeter for thermocouple readout

3.1 Take the reader.

3.2 Take all the available TCs.

3.3 For each sensor fill the following table (the data logger reads Temperature in °C directly):
Note the clean room temperature: 24.3 °C

Part number	Measured value (°C)	Datasheet value	Temperature value (°C)	OK
ST TC #1	28.2		29.3	OK
ST TC #2	26.2		29.1	OK
ST TC #3	24.8		27.8	OK
ST TC #4	26.1		31.8	OK

4. ST TC

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#1 INSTALLATION

4.1 SURFACE CLEANING
According to the Figure 1, clean the substrate surface (3 cm x 3 cm approximately) for the sensor installation.

4.1.1 The location of the thermocouple is shown in Figure 2.

4.1.2 Clean the surface using the cloth paper and the Isopropyl alcohol.

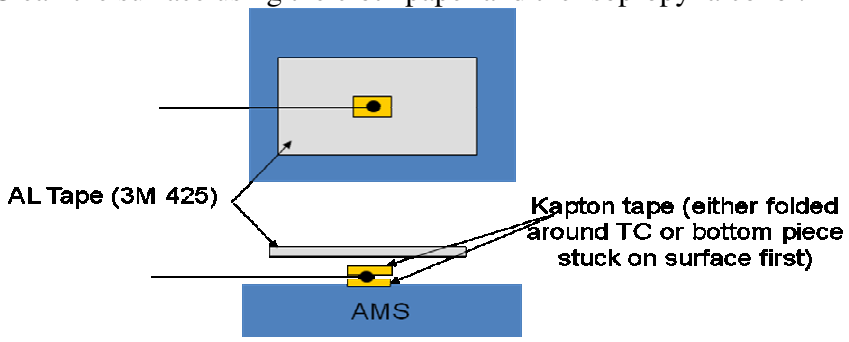

Figure 1 – General TC mounting technique

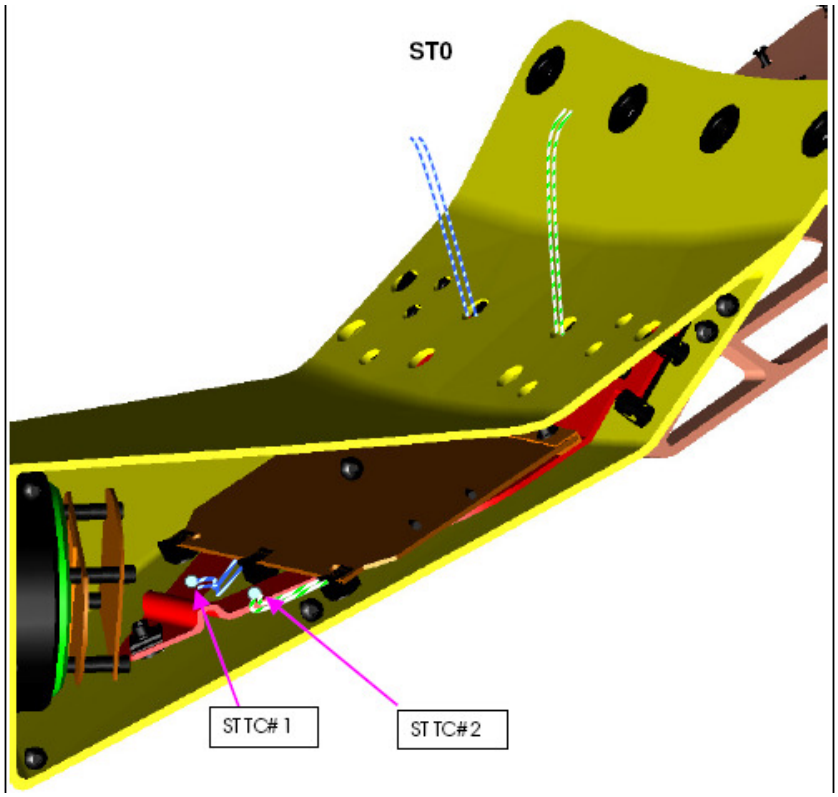

Figure 2 – ST TC #1 position on the electronic frame interface

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4.2 SENSOR FIXATION

4.2.1 Take one of the available TCs and fill the table:

TC identification number	Part number	Location of the TC on electronic frame interface
ST TC #1	N/A	As in Figure

4.2.2 Wrap the thermocouple in a small piece of Kapton tape to insulate it and position it on the subdetector OR put a piece of Kapton tape on the subsystem surface, on the clean area, center the thermocouple on this tape, and fix it in place with a larger piece of Kapton tape.

4.2.3 Take a photo to show the exact configuration.

4.2.4 Cover the thermocouple and Kapton tape with a larger piece of aluminum tape to fix it firmly in place (recommended AL tape size: ~2.5cmx2.5cm)

4.2.5 Take a photo

4.2.6 Record the photos files numbers:
ST TC#1, TC fixation photos files numbers STTC#1_sect_4.2.3.jpg
STTC#1_sect_4.2.5a.jpg
STTC#1_sect_4.2.5b.jpg

4.2.7 According to the ST installation position, report the cabling layout in the Figure 3. Fix the cable using ALUMINUM tape. Typically one piece of tape every 20 cm.

WARNING

BEFORE TO PUT THE ALUMINUM TAPE, CLEAN THE SURFACE WITH ISOPROPYL ALCOHOL

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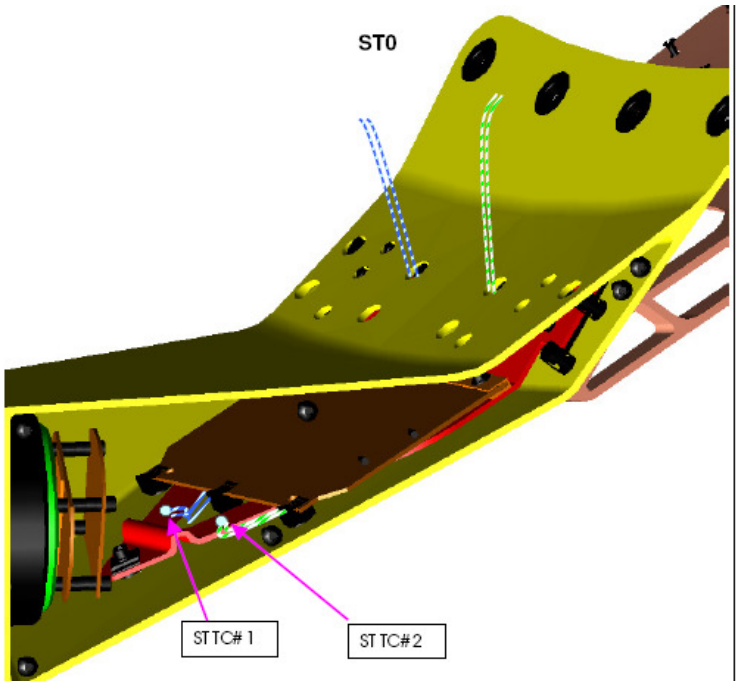

Figure 3 – ST TC #1 cable fixation.

4.2.8 Take pictures of the cables layout and record the photos files numbers:
ST TC #1, cable fixation photos files numbers: STTC#1_sect_4.2.8a.jpg
STTC#1_sect_4.2.8b.jpg

4.3 TC IDENTIFICATION.
Put the TC identification number “ST TC #1” 10 cm far from the cable end using the cable label.
If the thermocouple and cable on AMS will be hidden later, place a second label near where the cable will emerge, if this location is known.

4.4 TC VERIFICATION AFTER INSTALLATION
Check the functionality of the TC and fill the table:

TC identification number	Part number	Measured value	Datasheet value	Temperature value (°C)	OK
ST TC #1	N/A	24.0		24.9	OK

4.5 Touch TC head with gloved hand to check that temperature rises.

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20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	23. QA/DV

5. ST TC #2 INSTALLATION

5.1 SURFACE CLEANING
According to the Figure 4, clean the substrate surface (3 cm x 3 cm approximately) for the sensor installation.

5.1.1 The location of the thermocouple is shown in Figure 5.

5.1.2 Clean the surface using the cloth paper and the Isopropyl alcohol.

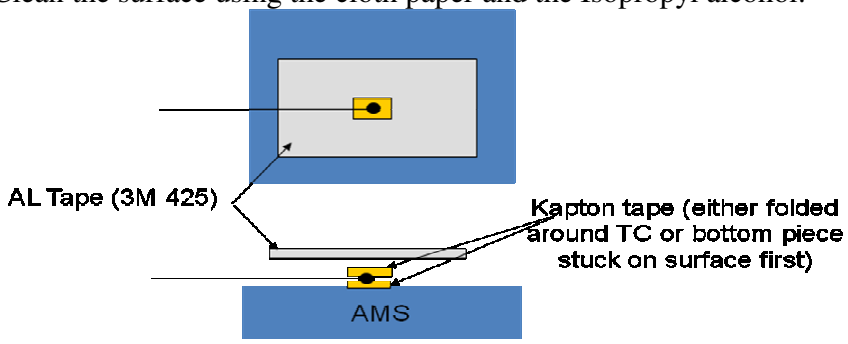

Figure 4 – General TC mounting technique

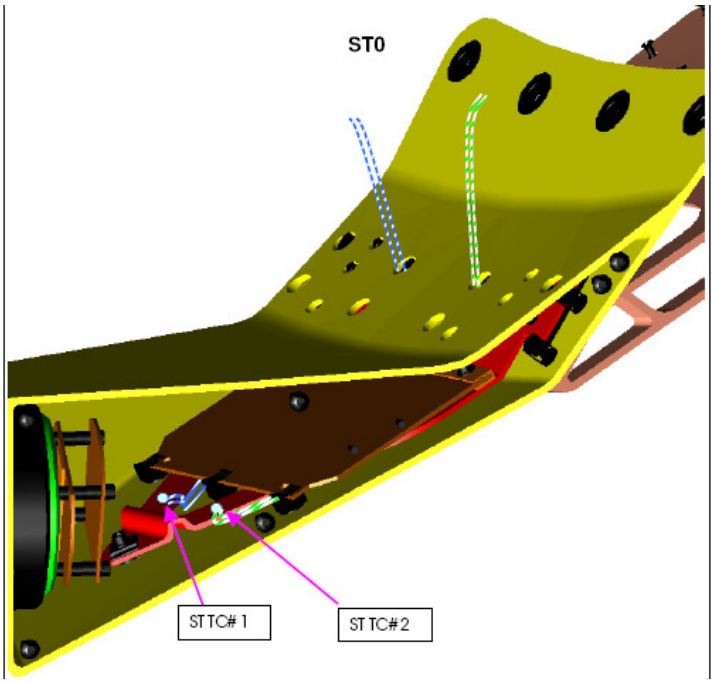

Figure 5 – ST TC #2 position on the electronic frame interface

5.2 SENSOR FIXATION

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20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	23. QA/DV

5.2.1 Take one of the available TCs and fill the table:

TC identification number	Part number	Location of the TC on electronic frame interface
ST TC #2	N/A	As in Figure

5.2.2 Wrap the thermocouple in a small piece of Kapton tape to insulate it and position it on the subdetector OR put a piece of Kapton tape on the subsystem surface, on the clean area, center the thermocouple on this tape, and fix it in place with a larger piece of Kapton tape.

5.2.3 Take a photo to show the exact configuration.

5.2.4 Cover the thermocouple and Kapton tape with a larger piece of aluminum tape to fix it firmly in place (recommended AL tape size: ~2.5cmx2.5cm)

5.2.5 Take a photo

5.2.6 Record the photos files numbers:
ST TC #2, TC fixation photos files numbers STTC#2_sect_5.2.3.jpg
STTC#2_sect_5.2.5a.jpg
STTC#2_sect_5.2.5b.jpg

5.2.7 According to the Star tracker installation position, report the cabling layout in the Figure 6. Fix the cable using ALUMINUM tape. Typically one piece of tape every 20 cm.

WARNING

BEFORE TO PUT THE ALUMINUM TAPE, CLEAN THE SURFACE WITH ISOPROPYL ALCOHOL

20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	VERIFICATION 23. QA/DV

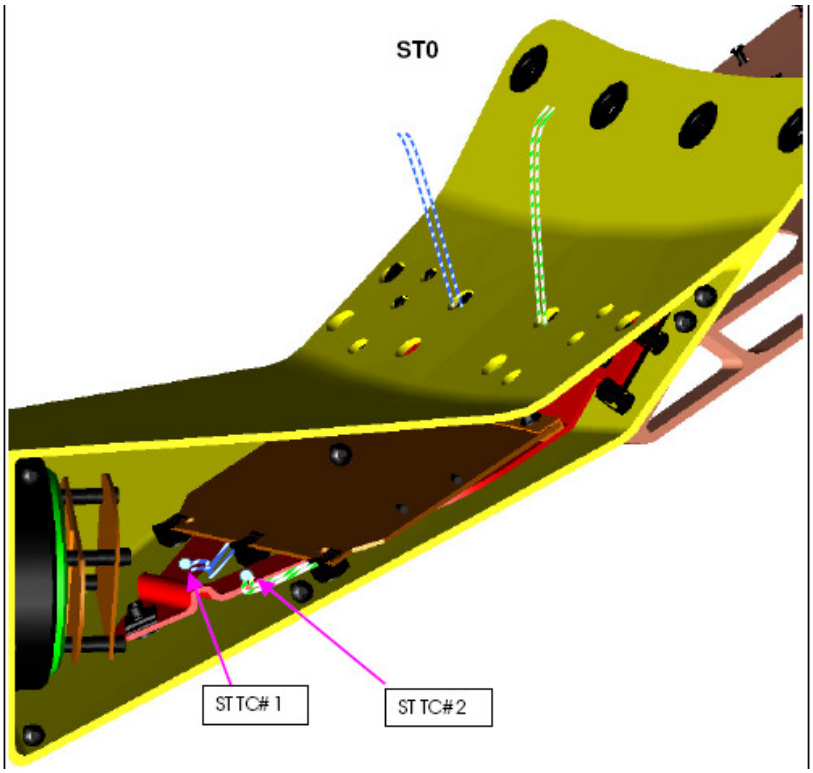

Figure 6 – ST TC #2 cable fixation.

5.2.8 Take pictures of the cables layout and record the photos files numbers:
ST TC #2, cable fixation photos files numbers: STTC#2_sect_5.2.8a.jpg
STTC#2_sect_5.2.8b.jpg

5.3 TC IDENTIFICATION.
Put the TC identification number “ST TC #2” 10 cm far from the cable end using the cable label.
If the thermocouple and cable on AMS will be hidden later, place a second label near where the cable will emerge, if this location is known.

5.4 TC VERIFICATION AFTER INSTALLATION
Check the functionality of the TC and fill the table:

TC identification number	Part number	Measured value	Datasheet value	Temperature value (°C)	OK
ST TC #2	N/A	23.8		25.1	OK

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5.5	Touch TC head with gloved hand to check that temperature rises.		
6.	ST TC #3 INSTALLATION		
6.1	SURFACE CLEANING According to the Figure 7, clean the substrate surface (3 cm x 3 cm approximately) for the sensor installation.		
6.1.1	The location of the thermocouple is shown in Figure 8.		
6.1.2	Clean the surface using the cloth paper and the Isopropyl alcohol.		

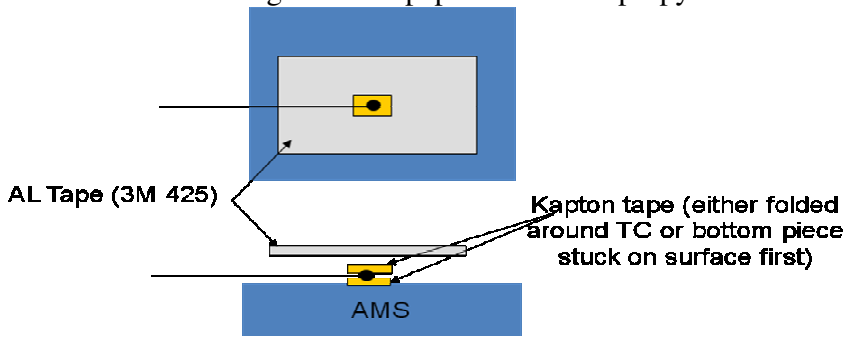

Figure 7 – General TC mounting technique

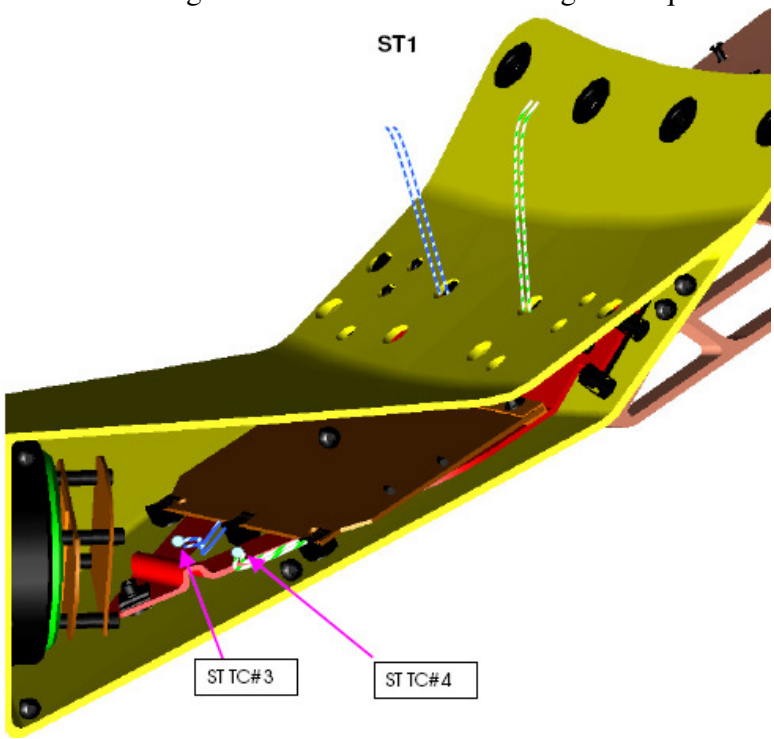

Figure 8 –ST TC #3 position on the electronic frame interface

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6.2 SENSOR FIXATION

6.2.1 Take one of the available TCs and fill the table:

TC identification number	Part number	Location of the TC on the electronic frame interface
ST TC #3	N/A	As in Figure

6.2.2 Wrap the thermocouple in a small piece of Kapton tape (to insulate it and position it on the subdetector OR put a piece of Kapton tape on the subsystem surface, on the clean area, center the thermocouple on this tape, and fix it in place with a larger piece of Kapton tape.

6.2.3 Take a photo to show the exact configuration.

6.2.4 Cover the thermocouple and Kapton tape with a larger piece of aluminum tape to fix it firmly in place (recommended AL tape size: ~2.5cmx2.5cm)

6.2.5 Take a photo

6.2.6 Record the photos files numbers:
ST TC #3 , TC fixation photos files numbers STTC#3_sect_6.2.3.jpg
STTC#3_sect_6.2.5a.jpg
STTC#3_sect_6.2.5b.jpg

6.2.7 According to the Star Tracker installation position, report the cabling layout in the Figure 9. Fix the cable using Aluminum tape. Typically one piece of tape every 20 cm.

WARNING

BEFORE TO PUT THE ALUMINIUM TAPE, CLEAN THE SURFACE WITH ISOPROPYL ALCOHOL

20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	VERIFICATION 23. QA/DV

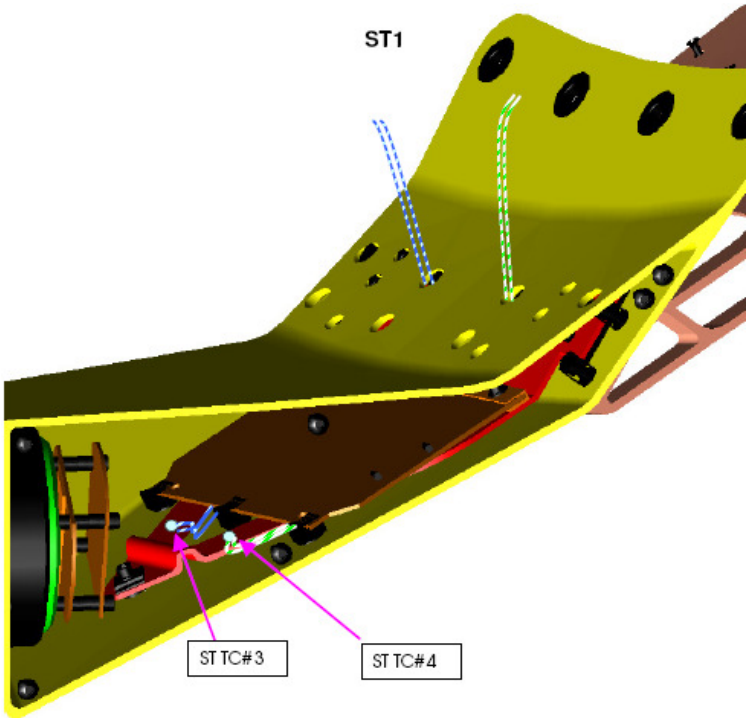

Figure 9 – ST TC #3 cable fixation.

6.2.8 Take pictures of the cables layout and record the photos files numbers:
ST TC #3 , cable fixation photos files numbers: STTC#3_sect_6.2.8.jpg

6.3 TC IDENTIFICATION.
Put the TC identification number “ST TC #3 ” 10 cm far from the cable end using the cable label.
If the thermocouple and cable on AMS will be hidden later, place a second label near where the cable will emerge, if this location is known.

6.4 TC VERIFICATION AFTER INSTALLATION
Check the functionality of the TC and fill the table:

TC identification number	Part number	Measured value	Datasheet value	Temperature value (°C)	OK
ST TC #3	N/A	23.6		25.2	OK

6.5 Touch TC head with gloved hand to check that temperature rises.

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7. ST TC #4 INSTALLATION

7.1 SURFACE CLEANING
According to the Figure 10, clean the substrate surface (3 cm x 3 cm approximately) for the sensor installation.

7.1.1 The location of the thermocouple is shown in Figure 11.

7.1.2 Clean the surface using the cloth paper and the Isopropyl alcohol.

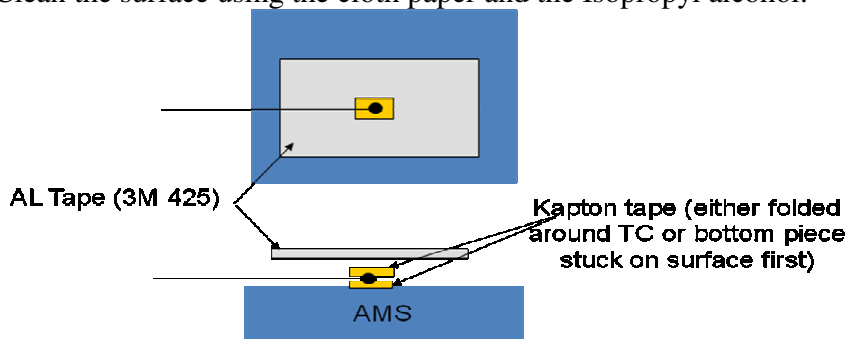

Figure 10 – General TC mounting technique

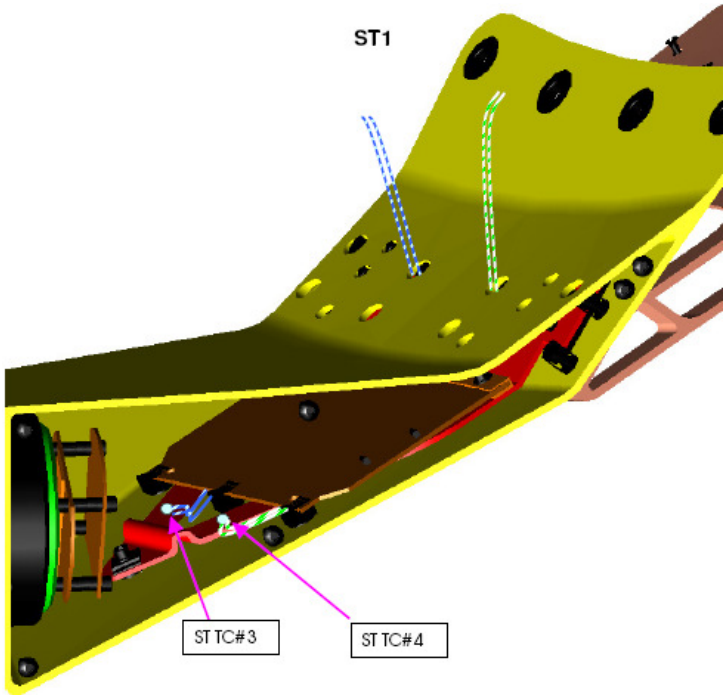

Figure 11 – ST TC #4 position on the electronic frame interface

7.2 SENSOR FIXATION

20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	VERIFICATION 23. QA/DV

7.2.1 Take one of the available TCs and fill the table:

TC identification number	Part number	Location of the TC on the electronic frame interface
ST TC #4	N/A	As in Figure

7.2.2 Wrap the thermocouple in a small piece of Kapton tape (to insulate it and position it on the subdetector OR put a piece of Kapton tape on the subsystem surface, on the clean area, center the thermocouple on this tape, and fix it in place with a larger piece of Kapton tape.

7.2.3 Take a photo to show the exact configuration.

7.2.4 Cover the thermocouple and Kapton tape with a larger piece of aluminum tape to fix it firmly in place (recommended AL tape size: ~2.5cmx2.5cm)

7.2.5 Take a photo

7.2.6 Record the photos files numbers:
ST TC #4 , TC fixation photos files numbers STTC#4_sect_7.2.3.jpg
STTC#4_sect_7.2.5.jpg

7.2.7 According to the Star Tracker installation position, report the cabling layout in the Figure 12. Fix the cable using Aluminum tape. Typically one piece of tape every 20 cm.

WARNING

BEFORE TO PUT THE ALUMINIUM TAPE, CLEAN THE SURFACE WITH ISOPROPYL ALCOHOL

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20. OPER SEQ. NO.	21. OPERATIONS (Print, Type, or Write Legibly)	VERIFICATION 22. TECH	VERIFICATION 23. QA/DV

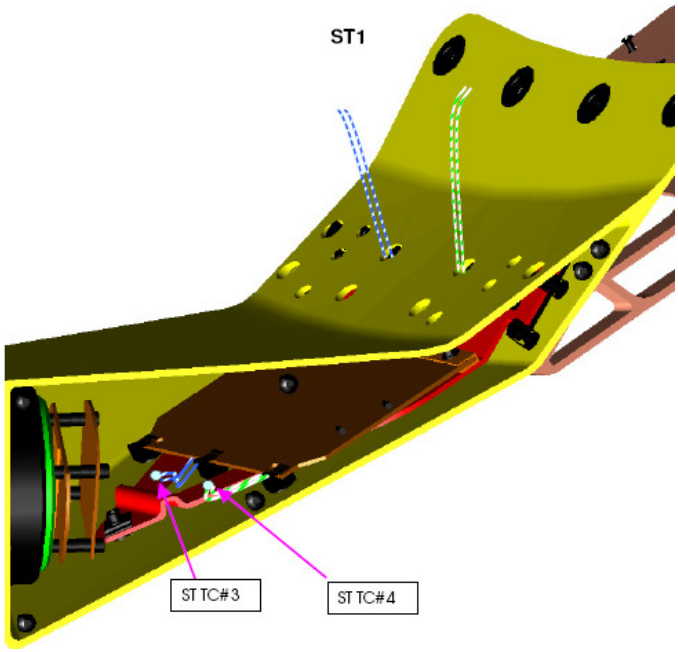

Figure 12 – ST TC #4 cable fixation.

7.2.8 Take pictures of the cables layout and record the photos files numbers:
ST TC #4, cable fixation photos files numbers: STTC#4_sect_7.2.8.jpg

7.3 TC IDENTIFICATION.
Put the TC identification number “ST TC #4 ” 10 cm far from the cable end using the cable label.
If the thermocouple and cable on AMS will be hidden later, place a second label near where the cable will emerge, if this location is known.

7.4 TC VERIFICATION AFTER INSTALLATION
Check the functionality of the TC and fill the table:

TC identification number	Part number	Measured value	Datasheet value	Temperature value (°C)	OK
ST TC #4	N/A	23.5		25.5	OK

7.5 Touch TC head with gloved hand to check that temperature rises.